



# Prolonged postoperative Ileus: what should be done to improve patient outcome?

Noam Shussman

Department of Surgery, Hadassah Hebrew University Medical Center, Jerusalem, Israel

Correspondence to: Noam Shussman, MD. Department of Surgery, Hadassah Hebrew University Medical Center, POB 12000, Jerusalem 91120, Israel.

Email: noams@hadassah.org.il.

Provenance: This is an invited article commissioned by Editor-in-Chief Minhua Zheng (Department of General Surgery, Ruijin Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai Minimal Invasive Surgery, Shanghai, China).

Comment on: Sugawara K, Kawaguchi Y, Nomura Y, *et al.* Perioperative Factors Predicting Prolonged Postoperative Ileus After Major Abdominal Surgery. *J Gastrointest Surg* 2017. [Epub ahead of print].

Received: 21 January 2018; Accepted: 30 January 2018; Published: 07 March 2018.

doi: 10.21037/ales.2018.02.04

View this article at: <http://dx.doi.org/10.21037/ales.2018.02.04>

Postoperative ileus (POI) is a transient inhibition of gastrointestinal (GI) motility that involves the entire GI tract (1). Prolonged POI is characterized by abdominal distention, nausea, vomiting and delayed passage of flatus and stool. It is defined by two or more of the following criteria occurring on or after the fourth postoperative day without prior resolution of POI: nausea or vomiting, inability to tolerate oral diet over 24 hours, absence of flatus over 24 hours, abdominal distension defined as increased abdominal girth with tympany on percussion, or radiologic confirmation of POI (2). While all patients undergoing bowel resection experience delayed GI recovery to some extent, prolonged POI is a major contributor to postoperative length of stay in patients undergoing major abdominal surgery (3). In addition, prolonged POI is a significant cause of postoperative morbidity in these patients, including malnutrition caused by delayed oral intake, thromboembolism caused by decreased ambulation, wound dehiscence and hernia formation secondary to abdominal distention and aspiration pneumonia (4).

Several factors have previously been described to contribute to the severity and duration of POI, including patient related factors, extent of bowel manipulation, operative time, amount of opioids used to treat postoperative pain and surgical approach (1,5-7). A more recent large series reviewing almost 10,000 patients from the American College of Surgeons National Surgical Quality Improvement Program database identified

several five risk factors for the development of prolonged POI including smoking, weight loss, preoperative oral antibiotics, mechanical bowel preparation, and surgical approach (8).

Sugawara *et al.* (9) conducted a retrospective study aimed to devise a model for stratifying the probability of prolonged POI in patients undergoing abdominal surgery. The authors have reviewed the records of 841 patients who underwent major abdominal surgery after excluding patients who underwent less extensive surgery, or on the other hand “ileus associated surgery”. They devised a nomogram by evaluating predictive factors for prolonged POI. In their cohort, 73 patients (8.8%) developed prolonged POI and on multivariate analysis factors that were found to be independent predictors to prolonged POI were smoking history (P value =0.025), colorectal surgery (P value =0.004) and an open surgical approach (P value =0.002). The prediction model the authors have developed is based on a score a patient receives for the presence of each of the three above mentioned risk factors which eventually translates into a probability to develop prolonged POI. The model showed a discrimination concordance index of 0.71 (95% CI, 0.66–0.77), which means a “good” even though not “strong” model (10). In this series, the probability to develop a prolonged POI in a patient with a smoking history who underwent open colorectal surgery was calculated to be 19.6%.

Since a “history of smoking” (as per the study

**Table 1** An example of an enhanced recovery after surgery (ERAS) protocol that refers to preoperative, intraoperative and postoperative factors. Adherence to ERAS protocols have been shown to reduce the incidence of prolonged POI, to enhance bowel recovery and to shorten hospital length of stay

Preoperative
1 Preoperative counselling and patient education
2 No bowel preparation
3 Preoperative carbohydrate loading
4 Antithrombotic prophylaxis started on the day prior to surgery
5 Intravenous antibiotics 30–60 minutes prior to surgery
Intraoperative
6 Minimally invasive surgical approach
7 Intravenous fluid therapy optimization
8 Normothermia
9 Pneumatic compression devices
Postoperative
10 No draining nasogastric tubes left routinely
11 No abdominal or pelvic drains left routinely
12 Regional blocks, avoiding opioids, multimodal analgesia
13 Prevention of postoperative nausea and vomiting
14 Early enteral nutrition
15 Early removal of urinary catheter
16 Full mobilization on the first postoperative day

definitions—including past history and not only around the time of surgery) and the type of surgery (as defined by the patient's disease) are non-modifiable factors, the most important factor of these three is the only modifiable factor which is the surgical approach. Laparoscopic surgery is associated with well-known benefits as a result of the reduced tissue trauma. These advantages include (but are not limited to) an earlier return of bowel function, with most studies showing approximately a 1-day reduction in the duration of POI in favor of the laparoscopic approach compared to open surgery (11,12). Laparoscopic surgery as well as hand-assisted laparoscopic surgery (HALS) have also been shown to involve a lower rate of POI and a lower requirement for nasogastric tube decompression postoperatively than open surgery (13).

Several other possible interventions have been shown to decrease the incidence of prolonged POI. Gum chewing is

a non-invasive, low cost and low risk intervention that has been shown in several studies to shorten POI. A recently published meta-analysis which evaluated 18 randomized controlled trials showed that chewing gum resulted in a statistically significant earlier recovery of bowel function and a lower risk of prolonged POI (odds ratio =0.41, P=0.003) (14).

Alvimopan is a competitive inhibitor of the  $\mu$ -opioid receptor hence it blocks the peripheral effect of opioid drugs on the GI tract. It has been shown in several multicenter randomized phase III trials to decrease the mean time to GI recovery after bowel resection surgery in 11 to 26 hours (7,15,16). Other pharmacological interventions have been studied (or are undergoing clinical trials nowadays) with clinically and statistically significant benefits yet to be proven. Most importantly, it has been shown that development of accelerated care protocols and pathways and adherence to these protocols may decrease postoperative length of stay and enhance GI motility (5,17,18). In the most recent study specifically looking at the relationship between adherence to Enhanced Recovery After Surgery (ERAS) protocol and the incidence of POI in 131 patients undergoing colorectal resections, the authors found that the time interval to passage of flatus, bowel movements and time to tolerate solid diet all decreased as adherence to the ERAS protocol increased (18). They also found that adherence to at least 85% of the items in the ERAS protocol protected patients from prolonged POI of  $\geq 4$  days.

Different institutions have developed various ERAS protocols which vary in between them but all refer to preoperative, intraoperative and postoperative factors. One example is shown in *Table 1*.

In conclusion, identifying the factors that predict prolonged POI as Sugawara *et al.* (9) did is indeed important. Even more important is understanding the pathways in which POI develops and proactively decreasing the incidence and severity of POI with the implementation of as many of the above mentioned means possible.

### Acknowledgements

None.

### Footnote

*Conflicts of Interest:* The author has no conflicts of interest to declare.

## References

1. Boeckstaens GE, de Jonge WJ. Neuroimmune mechanisms in postoperative ileus. *Gut* 2009;58:1300-11.
2. Vather R, Trivedi S, Bissett I. Defining postoperative ileus: results of a systematic review and global survey. *J Gastrointest Surg* 2013;17:962-72.
3. Kalff JC, Schraut WH, Simmons RL, et al. Surgical manipulation of the gut elicits an intestinal muscularis inflammatory response resulting in postsurgical ileus. *Ann Surg* 1998;228:652-63.
4. Doorly MG, Senagore AJ. Pathogenesis and clinical and economic consequences of postoperative ileus. *Surg Clin North Am* 2012;92:259-72, viii.
5. Augestad KM, Delaney CP. Postoperative ileus: impact of pharmacological treatment, laparoscopic surgery and enhanced recovery pathways. *World J Gastroenterol* 2010;16:2067-74.
6. Resnick J, Greenwald DA, Brandt LJ. Delayed gastric emptying and postoperative ileus after nongastric abdominal surgery: part I. *Am J Gastroenterol* 1997;92:751-62.
7. Senagore AJ, Bauer JJ, Du W, et al. Alvimopan accelerates gastrointestinal recovery after bowel resection regardless of age, gender, race, or concomitant medication use. *Surgery* 2007;142:478-86.
8. Murphy MM, Tevis SE, Kennedy GD. Independent risk factors for prolonged postoperative ileus development. *J Surg Res* 2016;201:279-85.
9. Sugawara K, Kawaguchi Y, Nomura Y, et al. Perioperative Factors Predicting Prolonged Postoperative Ileus After Major Abdominal Surgery. *J Gastrointest Surg* 2017. [Epub ahead of print].
10. Statistics How To. 2017. Statistics How To. Available online: <http://www.statisticshowto.com/c-statistic/>. Accessed 14 January 2018.
11. Schwenk W, Haase O, Neudecker J, et al. Short term benefits for laparoscopic colorectal resection. *Cochrane Database Syst Rev* 2005;(3):CD003145.
12. Lacy AM, Delgado S, Castells A, et al. The long-term results of a randomized clinical trial of laparoscopy-assisted versus open surgery for colon cancer. *Ann Surg* 2008;248:1-7.
13. Shussman N, Brown MR, Johnson MC, et al. Does nasogastric tube decompression get used less often with laparoscopic and hand-assisted compared with open colectomy? *Surg Endosc* 2013;27:4564-8.
14. Liu Q, Jiang H, Xu D, et al. Effect of gum chewing on ameliorating ileus following colorectal surgery: A meta-analysis of 18 randomized controlled trials. *Int J Surg* 2017;47:107-15.
15. Wolff BG, Michelassi F, Gerkin TM, et al. Alvimopan, a novel, peripherally acting mu opioid antagonist: results of a multicenter, randomized, double-blind, placebo-controlled, phase III trial of major abdominal surgery and postoperative ileus. *Ann Surg* 2004;240:728-34; discussion 734-5.
16. Ludwig K, Enker WE, Delaney CP, et al. Gastrointestinal tract recovery in patients undergoing bowel resection: results of a randomized trial of alvimopan and placebo with a standardized accelerated postoperative care pathway. *Arch Surg* 2008;143:1098-105.
17. Gouvas N, Tan E, Windsor A, et al. Fast-track vs standard care in colorectal surgery: a meta-analysis update. *Int J Colorectal Dis* 2009;24:1119-31.
18. Barbieux J, Hamy A, Talbot MF, et al. Does enhanced recovery reduce postoperative ileus after colorectal surgery? *J Visc Surg* 2017;154:79-85.

doi: 10.21037/ales.2018.02.04

**Cite this article as:** Shussman N. Prolonged postoperative Ileus: what should be done to improve patient outcome? *Ann Laparosc Endosc Surg* 2018;3:18.